REMARKS

Claims 1-27 are pending are all the claims pending in the application. Claims 1-10, 15-17 and 21-27 are rejected. Claims 11-14 and 18-20 are withdrawn from consideration.

1. Formalities

As an initial matter, Applicants note that in the Advisory Action of March 27, 2006, the Examiner indicated that the Amendment of February 27, 2006, was not entered. Therefore, this amendment enters modification to the application pending July 25, 2005.

2. Objections to the Drawing and Specification

The Examiner has objected to the Specification and Drawing because H(N)(Echo) is allegedly new matter. Applicants have removed H(N)(Echo) from Fig. 2 and the Specification but submit that a noise-dependent echo reduction function is supported by the original Specification for at least the reasons given below.

Drawing

To comply with the Examiner's request to illustrate the features of the claims in the Drawing, Applicants are submitting one replacement drawing sheet including Fig. 2. Applicants have made the following modifications to Fig. 2.

1) The input signal 1 has been labeled.

2) The input signal graph now includes the label "Noise."

3) The label for element 5 has been changed from "Echo Canceller (Subtraction)" to "Echo and/or Noise Canceller (Subtraction)."

4) The label for element 4 has been changed from "H(N)" to "Echo and/or Noise Reduction Function R."

5) The graph and H(N)(Echo) has been removed from the output of element 4.

6) The graph and Echo (detected) has been removed from the output of element 3.

7) The label "Echo and/or Noise Reduction Signal 8" has been added to the output of element 4.

8) The Speech Pause Detector 6 has been added.

In addition, Applicants cancel Fig. 3.

Specification

Applicants have modified the Specification to reflect the changes to the figures. Please see the *Amendments to the Specification* section.

Applicants submit that the no new matter has been added and that the changes to the Drawing and Specification are supported in the original Specification for at least the reasons given below.

A non-limiting object of the invention is to overcome the disadvantages of the prior art method of echo reduction, which produces "holes" in the background noise when there are speech pauses. The disadvantages are given in more detail in the Specification as originally filed, which states:

> Manifestly disadvantageous in the case of the known methods is the fact that, in the case of relatively loud, clearly audible noise and simultaneously large reduction of echo into the background noise due to the echo suppression, the occurrence of transient echo peaks causes "holes" to be "punched" into the otherwise uniform background noise, resulting in what is perceived as a disagreeable modulation of the transmitted telecommunications signal in the speech pauses.

Specification at page 3, lines 6-14.

The non-limiting object is achieved by ensuring that the degree of echo reduction is dependent on the current noise according to a function h(N). This non-limiting object is described in the original Specification as follows:

> This object is achieved both simply and effectively, according to the invention, in that the power value of the noise level N in the currently used telecommunications channel is continuously measured and/or estimated, and that the degree of reduction of the echo signals to be currently effected is set continuously and automatically, in dependence on the current noise level N, according to a predefined function h(N).

Specification at page 3, lines 24-31.

By using this method, "[t]he occurrence of "holes" in the background noise due to an excessive echo suppression is effectively avoided..." Specification at page 4, lines 8-10. In a non-limiting embodiment of the invention, "the function h(N) increases as N increases." Specification at page 4, lines 18-20.

Preferably, the function h(N) may be a function of the signal to noise ratio. Some variations of the function h(N) used in echo reduction are described in the original Specification as follows (but the variations are not limited to just these):

> Particularly preferred is a variant of the method according to the invention which is characterized by the fact that the predefined function h(N) is a function k(S/N) which depends on the signal-to-noise ratio, i.e., the quotient S/N from the power value of the signal level S of the wanted signals to be transmitted and the power value of the noise level N, or that the predefined function h(N) is a function k'(N/S) which depends on the reciprocal N/S of this quotient, preferably on N/(N+S).
>
> For reasons of simpler, practical realization, a function of (S+N)/N or of (S+N)/S can also be used. Particularly practical for realization of the method on a digital signal processor (=DSP) is the use of the function k'[N/(N+S)], which runs between 0 and 1.

Specification at page 4, line 30, to page 5, line 12.

Therefore, as described above, function h(N) may be a function k'[N/(N+S)] when used in echo reduction. Accordingly, the degree of echo reduction may be set in dependence on the function k'[N/(N+S)]. A more detailed description of the function k'[N/(N+S)] is given in the original Specification at least at page 15, line 27, to page 16, line 25.

A generalized noise-dependent echo reduction function may be described as d(N,ES,τ_E,ERL,thrs). The noise-dependent echo reduction function d(N,ES,τ_E,ERL,thrs) may be "applied independently and additionally [to a reduction signal] if the estimated echo signal exceeds the predefined threshold value thrs." Specification at page 13, lines 1-7.

Therefore, Applicants submit that from the above description it is clear that the function d(N,ES,τ_E,ERL,thrs) sets the degree of echo reduction, and in an embodiment of the present invention, d(N,ES,τ_E,ERL,thrs) includes the function h(N), which in turn, may be k'[N/(N+S)].

However, also consistent with an embodiment of the invention, "the input-side noise signal N [may be] advantageously reduced" by a value N_A "according to the equation N_A=N*h(N)." Specification at page 4, lines 12-15. Although not explicitly described in the specification, the value N_A may then be subtracted from the input signal to achieve noise reduction. Applicants submit that one skilled in the art at the time of the invention would have known that the noise reduction signal N_A is simply subtracted from the input signal. (As additional support, see Specification at page 2, lines 6-24, which discusses subtracting echo signals from the input signal; the echo subtraction would be analogous to the noise subtraction.)

Similar to the echo reduction described earlier, the function h(N) in the case for noise reduction may be a function of the signal to noise ratio. Some variations of h(N) used in noise reduction are described in the original Specification as follows (but the variations are not limited to just these):

> Particularly preferred is a variant of the above embodiment of the method according to the invention in which the degree of reduction of the noise level N to be currently effected is set continuously and automatically, in dependence on the current noise level N, according to a predefined function f(N) or g(S/N) or g'(N/S), preferably g'(N/[N+S]). The degree of the noise reduction is thus determined according to the particular situation and used to control a noise suppression. This, by simple means, enables an overall acoustic perception to be produced which is as comfortable as possible to the human ear and can be adapted to individual requirements according to preference.

Specification at page 7, line 22, to page 8, line 2.

Therefore, as described above, function h(N) may be a function g'(N/[N+S] when used in noise reduction. Accordingly, the degree of noise reduction may be set in dependence on the function g'(N/[N+S]. A more detailed description of the function g'(N/[N+S] is given in the Specification at least at page 15, lines 13-25.

A generalized noise reduction function may be described as g(S/N). Specification at page 13, line 6. Applicants submit that, from the above description, it is clear that the function g(S/N) sets the degree of noise reduction, and that, in an embodiment of the present invention, g(S/N) includes the function h(N), which in turn, may be g'(N/[N+S].

Therefore, as described above, a function h(N) may be used in noise reduction (g'(N/[N+S]) and a function h(N) may be used in echo reduction (k'[N/(N+S)]).

In earlier responses to the U.S. Patent and Trademark Office, Applicants used the function h(N) in the figures that were newly submitted. However, it now appears as if the use of h(N) may have been confusing. Accordingly, Applicants have modified Fig. 2 to reference, instead, a reduction function R. The reduction function R may describe a reduction of signal levels for noise and/or echoes. For example, the reduction function R may be a general reduction function for both noise and echoes and may be described as follows:

$$R(S,N,ES,\tau_E,ERL,thrs) \sim g(S/N) * d(N,ES,\tau_E,ERL,thrs).$$

Specification at page 13, line 1.

However, Applicants note that, in an embodiment consistent with the present invention, noise reduction control may be separate from the echo reduction control. See Specification at least at page 12, lines 26-29. Accordingly, the reduction function R may include, for example, just the noise-dependent echo reduction function $d(N,ES,\tau_E,ERL,thrs)$.

Because the Fig. 2 has been modified to include the reduction function R, Applicants have canceled Fig. 3, which was originally submitted to illustrate the subject matter of claim 17, which recites "controlling separately the suppression or reduction of the noise signals and the reduction of the echo signals." Applicants submit that the features in claim 17 are illustrated in Fig. 2 since the Specification makes clear that the noise reduction function g(S/N) may be independent of the noise-dependent echo reduction function $d(N,ES,\tau_E,ERL,thrs)$. See at least Specification at page 13, lines 1-7, and at page 12, lines 26-29.

In addition, in response to the Examiner's objection that the speech pause detector of claim 15 is not illustrated, Applicants have added a speech pause detector 6 to Fig. 2.

Therefore, for at least the above reasons, Applicants submit that the changes to the Drawing and Specification are not new matter, and the original Specification would have been fully enabling to one skilled in the art to practice the claims.

3. Claim Rejections Under 35 U.S.C. § 112, First Paragraph

The Examiner has rejected claims 1-10, 15-17 and 21-27 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner contends that "setting continuously and automatically a degree of reduction of the echo signals to be currently effected, in dependence on the noise level N of the current channel, according to a predefined function h(N)," as set forth in claim 1, is not supported.

Applicants respectfully traverse the rejection.

As described above, in a non-limiting embodiment of the invention, a general noise-dependent echo reduction function $d(N,ES,\tau_E,ERL,thrs)$ may include the function h(N), which may be the function $k'[N/(N+S)]$. Accordingly, Applicants submit that the Specification does support the claimed setting continuously and automatically a degree of reduction of the echo signals according to a predefined function h(N), as set forth in claim 1.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: May 18, 2006

AMENDMENTS TO THE DRAWINGS

Applicants are submitting one replacement drawing sheet including Fig. 2. Applicants have made the following modifications to Fig. 2.

1) The input signal 1 has been labeled.
2) The input signal graph now includes the label "Noise."
3) The label for element 5 has been changed from "Echo Canceller (Subtraction)" to "Echo and/or Noise Canceller (Subtraction)."
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7) The label "Echo and/or Noise Reduction Signal 8" has been added.
8) The Speech Pause Detector 6 has been added to the input of element 4.

With this amendment, Applicants cancel Fig. 3.

Attachment: One Replacement Sheet